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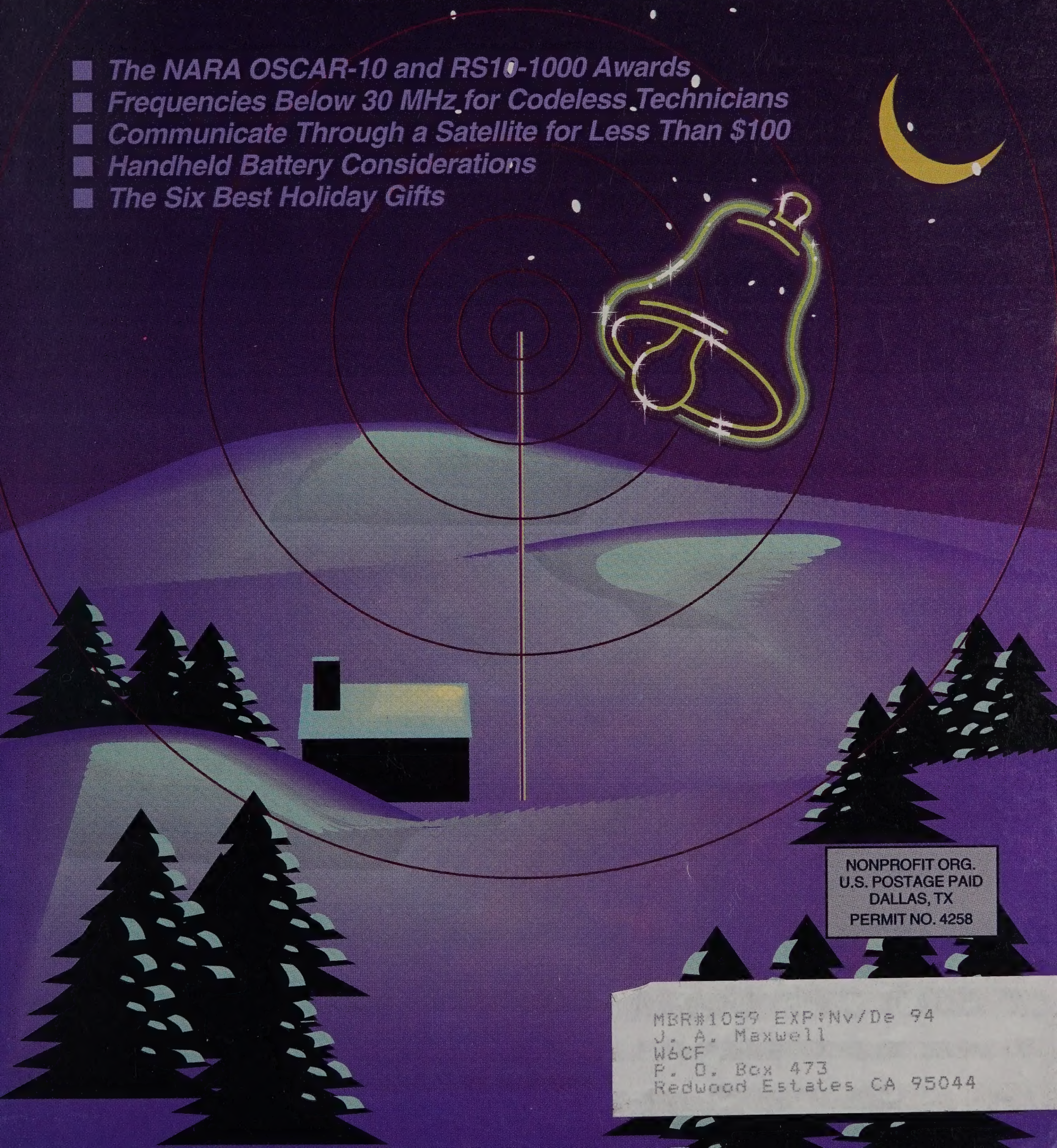
The Amateur Radio
COMMUNICATOR

NOVEMBER/DECEMBER 1992
Volume 2 Number 6

- The NARA OSCAR-10 and RS10-1000 Awards
- Frequencies Below 30 MHz for Codeless Technicians
- Communicate Through a Satellite for Less Than $100
- Handheld Battery Considerations
- The Six Best Holiday Gifts



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Choose Your Mobile In 3 Easy Steps:

Step 1 Choose Your Bands!

🟥 Single Band: 2 Meters

Today's most popular band, the best place for new hams to meet old hands, learn good operating procedures. Very friendly, thousands of open repeaters & autopatches everywhere. Great for on/off-the-road help. Crowded, though, especially in cities. Single-band mobile is easy to learn & use. No-Code friendly!

🟥 Multiple Band:
🟨 2 Meter/440MHz

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🟨 440 MHz

Next most popular band, less crowded with more high-tech, "smart" repeaters offering autopatch, remote base, linking, digital-voice recording. Some are limited-access (PL). Allows crossband repeating between singleband handhelds & dualband mobiles. 440 gives access to advanced technical info. This is where the pros hang out! No-Code friendly!

🟥
🟥 2Meter/220MHz

For the unconventional, this combines the most popular & the least crowded bands. Gives access to the people & services on 2M, plus the privacy & open space of 220, plus the advantages of telephone-like duplexing. Valuable where privacy is a concern.

🟥 220MHz

Fairly quiet, less crowded than 440, with almost half as many repeaters and the same high-tech functions. Plenty of open channels for semi-private conversation. Great place to meet newcomers, youngsters. Ideal for ham family, since all classes have voice privileges on 220. No-Code friendly!

🟥
🟨
🟪 2M/440MHz/1.2GHz

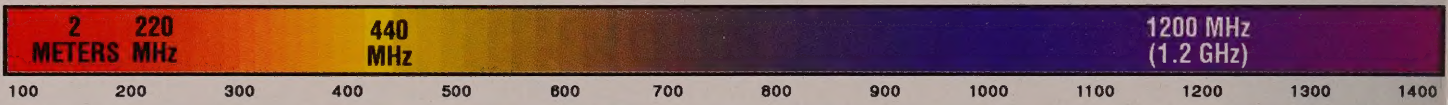
If you live and breathe radio, these are the bands for you! They give you the activity, the expandability and the novelty. Particularly useful for advanced hams who work in the city and live in the suburbs.

🟪 1.2 GHz

Radio's new frontier for ham pioneers. Shorter range than 2M or 220/440 in the open, but penetrates buildings, even elevators & underground garages. Excellent for cities. Crystal clear reception. Signals can be "bounced" for distance. Number of repeaters increasing faster than any other band.

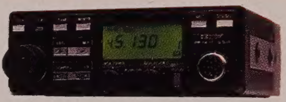
🟥
🟨
🟪 MultiBand

Widest selection of all: start with 2M/440. Add 6M for No-Code Skywave privileges. Add 10M for Novice and Tech-Plus privileges. Add 1.2GHz for the big city. If you're a shortwave buff, add scanning and SWL. Additional capacity sold as add-on modules.



Step 2 Choose Your Radio!

IC-28H 2 Meters



Ideal starter rig. 45-W single band, 21 memories, LCD display. Receives NOAA/WX

IC-228H 2 Meters

Same as IC-28, w/ color display, more skip & scan features & priority watch.

IC-229H 2 Meters

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One touch control, color-coded controls. 25/45W output, simultaneous reception, crossband repeat, 15 memories/band.

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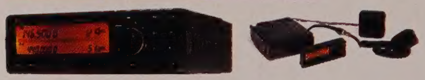
IC-901 Modular MultiBand



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ON THE COVER

THERE IS NO DOUBT that this is a special time of year for all of us. It's a time for gathering our friends and family together and giving thanks. From all of us at The National Amateur Radio Association, we wish you and your loved ones Happy Holidays from our "family" to yours. Cover design by Patricia Meeks, KS7L.

The Amateur Radio Communicator

The Amateur Radio Communicator is published bi-monthly and is the official journal of the National Amateur Radio Association (NARA), P.O. Box 598, Redmond, WA 98073-0598.

The National Amateur Radio Association is incorporated in the State of Washington and is a non-profit organization as defined in Section 501(c)(3) of the Internal Revenue Service Code.

Organization Goals

The broad goal of NARA is to publicize Amateur Radio and to encourage people to become Amateurs by earning an entry level Novice or Technician Class license.

The organization has five specific goals within this broad framework. These are to a) publicize Amateur Radio to the general public, b) attract young people to the Amateur Radio Service, c) increase the stature and benefits of the Novice and Technician Class licenses, d) represent the interests of Novice and Technician Class Amateurs at the national level and e) make all Amateurs aware that our radio frequencies are in jeopardy from commercial interests. More specifically:

A. NARA advertises in various consumer publications to create public awareness of the Amateur Radio Service.

B. NARA is specifically interested in encouraging young people to join our fraternity. A core of young people insures growth of the Amateur Radio Service.

C. NARA believes that the Novice and Technician classes are important and respected entry level licenses into the Amateur Radio fraternity. We are committed to increasing its benefits and stature in the Amateur Radio community.

D. NARA is committed to representing the interests of all Novice and Technician Class Amateurs at the national level. We continue to review information from the Federal Communications Commission and submit material to them with the Novice and Technician perspective in mind.

E. Finally, NARA is very concerned that confiscation of frequencies assigned to the Amateur Radio Service will continue. NARA is committed to obtaining new spectrum for the continued growth in numbers of Novice and Technician Class Amateurs.

Membership and Subscriptions

Those joining NARA receive a subscription to *The Amateur Radio Communicator* for a period of one year. The combined cost of membership and magazine is $10.00 per year in all areas with a U.S. ZIP code.

The NARA membership and subscription to *The Amateur Radio Communicator* cannot be separated.

It is not necessary to hold an Amateur Radio license to become a member of the National Amateur Radio Association. The only "qualification" is an interest in radio communications.

How To Contact NARA

National Amateur Radio Association
P.O. Box 598
Redmond, WA 98073-0598

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CompuServe	76702,753
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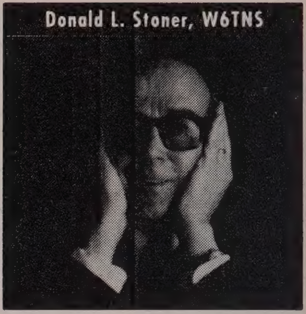

Donald L. Stoner, W6TNS

Frequencies Below 30 MHz For Codeless Technicians

by Don Stoner, W6TNS

DURING FEDERAL Communications Commission Forums, at numerous ham conventions, staff personnel have mentioned their annoyance from receiving frivolous petitions. The petitions are not usually well thought out. They are often the pet project of some ham who doesn't like some of the rules, for one reason or another. I suspect the FCC gets more petitions from hams than any other area they regulate.

For those newcomers who don't have any idea what I am talking about, there is a section in Part 2 of the FCC Rules and Regulations that permits anyone who wants the rules changed to petition the FCC. There is a standard format and procedure. It's all there in Part 2.

The reason for mentioning the petition process (beside encouraging readers to think before they petition) is this: The National Amateur Radio Association is considering petitioning the FCC for another frequency allocation for Technician Class Amateurs. **I'd like to see Technician hams (in other words, Codeless Techs) given access to the Amateur 160-meter band!** Presently one must hold a General class (or higher) license to work 160, which extends for 1.8 to 2.0 MHz, (just above the AM broadcast band). I propose that Codeless Techs be permitted to use this band **in the CW mode only and with a power input not to exceed five watts.** More about this later.

But, before we dump a petition on the lap of regulation, and cause the staff a lot of work, we'd like to know if our concept would enjoy the broad support of the Amateur Radio community. If not, it's a waste of time for everybody concerned. Before I describe my vision for you, I'd like to cover a couple of points for your consideration.

We're Still Arguing About The Code!

I can't believe it! The merits of Morse continue to be debated. We still hear the elitists say *"You're not a real ham until you know the code."* I guess I have to keep repeating it until those folks get it straight. In my humble opinion, Morse is nothing more or less than a filter to separate the motivated and unmotivated. It's a fun and relaxing aspect of ham radio but it won't cure AIDS and it doesn't insure that you have the "right stuff" as a ham. It is a filter to keep the unmotivated off the HF (below 30 MHz) bands in order to minimize increasing interference to the motivated. It's as simple as that. Let's be honest with ourselves and each other and not try to make Morse something that it is not.

I'd like to see Technician hams (in other words, Codeless Techs) given access to the Amateur 160-meter band!

The official position of NARA on Morse is pretty simple. We'd like to see beginners learn the code and earn extra operating privileges. But this desire is not elitist. It's no different than wanting you to get on the satellites, work QRP or get involved in traffic handling. These are all wonderful aspects of ham radio and there is a sense of accomplishment from learning to master any aspect of our hobby.

How Do You Learn The Code?

NARA, the ARRL and just about everyone else, sells code tapes and computer software to make *learning to receive* Morse easy. But these aids do nothing about teaching you to *send! Nothing* is as effective (and certainly not as enjoyable) as on-the-air code practice and communication with someone else. But if you are a Codeless Tech, how do you do this? You don't do it on the Tech's favorite band, two meters. I have yet to hear any code practice on two meters. The CW action is all on the HF bands. But Codeless Techs are precluded from operating there or anywhere else below 30 MHz, for that matter. Techs can only access HF by passing a code test. It's sort of a catch 22 situation. We'd like to see a portion of 160 meters allocated to Codeless

Techs as **a code-practice band**! What a novel idea, to have a common meeting ground for newcomers and old timers. There is no band where old timers get on the air and chat with Technicians, using CW. The hams who operate on 160 meters are a special breed, but they are not elitists. More than a few built their own 160-meter rigs back in the *good ole days*. I think they would welcome newcomers with open arms.

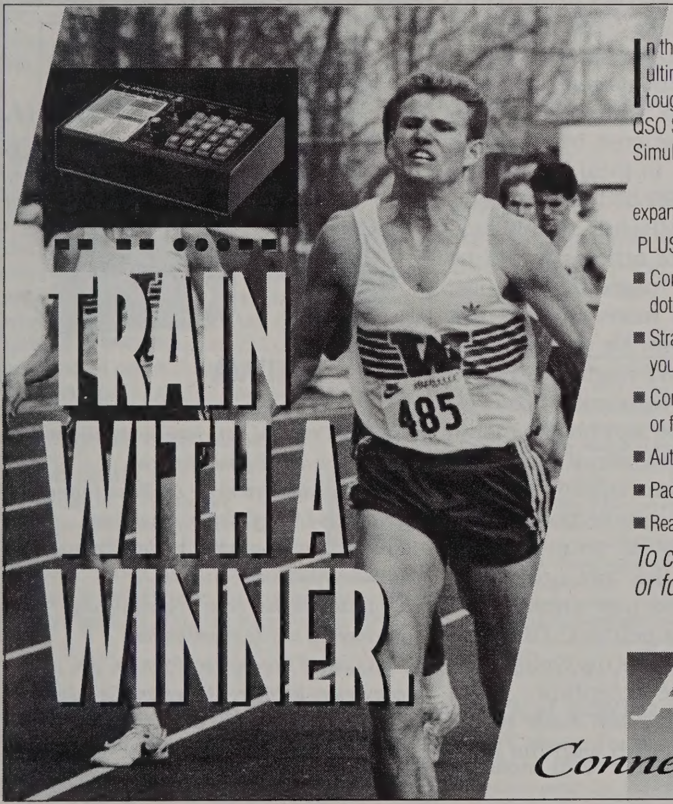
What About International Law?

The International Telecommunications Union (ITU) has declared that Amateurs must "**send correctly by hand and receive correctly by ear texts in the International Morse Code**" in order to have access to the high-frequency bands.

But wait a minute! How come the Japanese let their hams operate voice and CW on HF without passing a Morse test? The Japanese concluded it was in their **national best interests** to have lots of hams (they came to this conclusion years before we did, which is about par for the course). So they got "cutsie" with the ITU and stated that since these codeless Amateurs were only running 25 watts, the signals were too weak to escape their national boundaries. And since they were an island nation, they could not interfere with other countries. It's a lot of bullpuckey, of course, but it *sure worked* for the Japanese! As of the Spring of 1992, the total number of radio stations known operating in Japan is 7,574,478. Of these, 1,203,226 (or 15.9%) are Amateur Radio. Radio operators in Japan number 3,972,074 of which 2,280,705 are Amateur licensees. Put another way, 57.4% of all radio operators in Japan hold Amateur Radio licenses! A copy of their *CQ Ham Radio* magazine that I am holding is almost 600 pages (much of it advertising) and weighs about two pounds! Japan is the mecca for ham radio gear and they are the leading exporter. Probably every ham in the United States owns a piece of Japanese ham equipment. In their national interests? You bet your sweet *@#(^$!

Our FCC plays it straight. No CW—no HF...period! The FCC should not be criticized for this. There's a lot to be said for following the letter of the law. Our nation could use a little more of this, in all areas. But I wonder what the hams, who work at the FCC, think when they look at their Japanese transceivers. Are they sad about America's second-rate status? I know I am.

So the law says that one must have a knowledge of Morse to operate the high-frequency bands. But it can be argued that **there would be inherent compliance** with international regulations if Codeless Techs were allowed access to 160 meters. How do you communicate on a code-



In the arena of memory keyers, the MM-3 is championship caliber. This is the ultimate Morse trainer, needed to upgrade your license. You'll break through those tough-to-crack code speed barriers with five easy-to-use training modes, including QSO Simulator for realistic "rag chews" without going on the air and DX Contest Simulator to sharpen your competitive skills.

The MM-3 delivers 20 "soft partitioned" memories from standard 8K and expands to 32K (36,000 characters).

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To connect with the AEA dealer nearest you or for an MM-3 product sheet, call (800) 432-8873.

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only allocation if you don't know the code? You **must** have a knowledge of Morse if you are to communicate using it. There is nothing "cutsie" about this—it's pretty basic.

So NARA would like to see a small slice of 160 meters allocated to "nocoders." How big a slice? Probably about as much as one can "rubber" a quartz crystal. Since all the contacts would be local, there probably would not be more than 10-20 people operating in an area at any one time. *A band 10-25 kHz wide would be more than sufficient.* This would leave plenty of room for the 160-meter DXers and SSB voice "ragchewers."

As mentioned earlier, Codeless Techs would be permitted CW only and five-watts maximum-power input. This is enough power so that one could communicate with others over a radius of 20 miles or so, using a simple longwire antenna. This is more than enough range to work others in your school, Scout troop, ham club or church group.

THE FUTURE OF OUR HOBBY!

This month's featured Amateur is 13-year old Patrick Mills, KD6LTC, of Forestville, California. Along with being a ham, Patrick is also an Honor Society student at Forestville School. As you can see he is also a Boy Scout (Troop 150). For recreation "OM" KD6LTC enjoys playing baseball and the trombone, but ham radio is his favorite sport. Patrick's picture and information were sent to us by a secret admirer! ❑

How About A Generic Rig?

Let's design a generic rig for this allocation. It would have a couple of cheap audio transistors to deliver the RF to the antenna. The receiver could be a simple superhet with a sharp filter made from inexpensive 3.58-MHz color TV crystals. To insure compliance with the power specification, the whole "shebang" would operate off a 12 volt, 500 mA, wall mounted, UL-approved transformer. Maybe we could make it compatible with a Nintendo game transformer and retire those suckers to the closet.

Anyway, this rig could be made in kit form with a standard generic design for $50-75. I'll bet Motorola would just love to design a generic rig and give the design to the ham fraternity! And I'd also be willing to bet it wouldn't use Toshiba semiconductors! What a great project for ham radio clubs and school Science and Technology Clubs. These clubs, and even ham radio stores, could loan or sell the 160-meter rigs to newcomers. Companies like Icom, Kenwood and Yaesu could give a $100 trade-in for the little rig against the cost of their big HF transceiver. They could recover the cost by donating the trade-in rigs to local ham clubs and taking the IRS deduction. Membership in the QRP clubs would skyrocket. Zillions of articles would be written on how to get more range, how to make a more efficient antenna, how to improve your CW accent and so on. We might even see a few articles on which end of the soldering iron to hold and how to install parts on an etched circuit board.

So what do you think? Has the rosin-core solder smoke finally atrophied the brain of your humble editor? Is this the "pet project" of some "crank" and just another potentially frivolous petition? I'd like to hear your thoughts. If my fvolunteers can get favorable acceptance in all 50 states then I would have to declare my intent to run with the idea.

73 Don, W6TNS ❑

HOT TIPS

Frequency Charts!

Icom America, Bellevue, Washington, offers free frequency charts for both VHF/UHF and HF frequency band plans. These brightly colored charts clearly display the frequency privileges for both the different license classes and the modes of transmissions. These are great for the ham shack, classroom, or simply for the person who needs a better understanding of the frequency allocations. Just phone toll-free #1-800-999-9877 to request your copy today! (Special requests for larger quantities may require assistance.)

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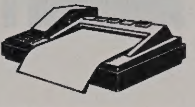

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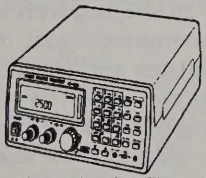
1000 Channels

500KHz to 1300MHz coverage in a programmable hand held. Ten scan banks, ten search banks. Lockout on search and scan. AM plus narrow and broadcast FM. Priority, hold, delay and selectable search increment of 5 to 995 KHz. Permanent memory. 4 AA ni-cads and wall plus cig charger included along with belt clip, case, ant. & earphone. Size: 6 7/8 x 1 3/4 x 2 1/2. Wt 12 oz. Fax fact document # 205.



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Computer Control

62 Scan Banks, 16 Search Banks, 35 Channels per second. Computer control for logging and spectrum display. AM, NFM, WFM, & BFO for CW/SSB. Priority bank, delay/hold and selectable search increments. Permanent memory. DC or AC with adaptors. Mtng Brkt & Antenna included. Size: 2 1/4H x 5 5/8W x 6 1/2D. Wt. 1lb. Fax fact # 305

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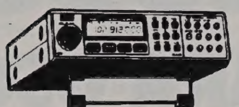
Free Stuff

Demo disk of SCS (scanner control system) software for AR 3000 & AR2500. Call toll free to order. Also, Free with AR2500: Control software, a $49.95 value. Allocation chart of all voice frequencies. Dial Fax Facts for doc. #999.

Mobile Scanners



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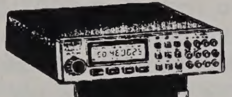

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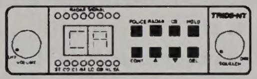

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INTRODUCING!

The NARA OSCAR-10 And RS10-1000 Awards

AS HINTED IN THE LAST issue of the *Amateur Radio Communicator*, your National Amateur Radio Association is delighted to introduce its new series of **NARA Space Communication Awards—the NARA OSCAR-10 and RS10-1000 certificate and plaque.**

Now, most of you "old-timers"—but perhaps less of you newcomers—are already aware that the term OSCAR has been utilized since the 1960s as an acronym for "Orbiting Satellites Carrying Amateur Radio." Back then of course, the notion of an earth-orbiting satellite designed and launched explicitly for the Amateur Radio Service was certainly very much an exciting novelty. Well, today in the 1990s, satellites are no less inspiring or exhilarating to use. But they're actually somewhat more prevalent and less novel (which is beneficial for you, the Amateur) and, in fact, today number over 15 for you to enjoy.

Today's plethora of Amateur Radio satellites makes it possible for even the modestly-equipped ham to work *many* countries throughout the world, and to make thousands of new friends, worldwide, on a broad variety of modes. Amateurs use packet, RTTY, CW, SSB voice, and even Slow Scan Television to make their OSCAR contacts. Some hams enjoy the automatic message-forwarding features of the PACSAT mailboxes, while others are content to compare notes amongst themselves about the photographs of our planet that WEBERSAT transmits, using increasingly typical and easily-obtained Amateur Radio equipment and software.

This seems like an excellent time to remind you that satellite operation is very much in tune with today's problems that Amateurs often face. For example, many hams are less than enthused—and for good reason—with the fact that modern-day telephones, televisions, VCRs and other home-entertainment devices are not able to sufficiently reject the perfectly legal amounts of energy that Amateur stations generate on HF. But when operating satellites, there is rarely a need for much power at all. Equally as important to many Amateurs is the fact that the antennas required for operation through most of today's Amateur satellites are quite tiny, particularly when compared with those required on the traditional HF bands. And Amateurs with local antenna ordinances to concern themselves with, are delighted when they discover that most of the present day Amateur satellites will respond quite adequately to antennas mounted in the attic, or even below ground in the basement of a condo! Clearly, the Amateur Satellite Service now offers much in the way of "friendly neighbor" status to an increasing number of hams.

In keeping with the NARA Awards Committee's goal of producing certificates and plaques that *all* licensees can obtain for each of the awards programs offered, we're pleased to be able to state that the *OSCAR-10 award* is available to all classes of Amateur Radio licensee. Technicians and above in the US of course have instant access, because of their license class frequency allocations, to virtually all of the satellite uplink frequencies.

But what about Novices? Granted, it will take some creativity for Novices to earn the *OSCAR-10 award*, but remember that it *can* be done.

All NARA Awards Program applications should be sent to:

NARA Awards Committee
104 Park Rd., Suite #6
West Hartford, CT 06119

Applications must contain the necessary QSL card photocopies, and the $10.00 fee for certificate *or* $35.00 fee for plaque. Gold leaf endorsements are $3.00 each.

All portions of the application become the property of NARA and cannot be returned. Thus, QSL cards should *not* be sent. Decisions of the NARA Awards Committee are final. Questions and suggestions about the NARA Awards Program are welcomed. SASEs appreciated!

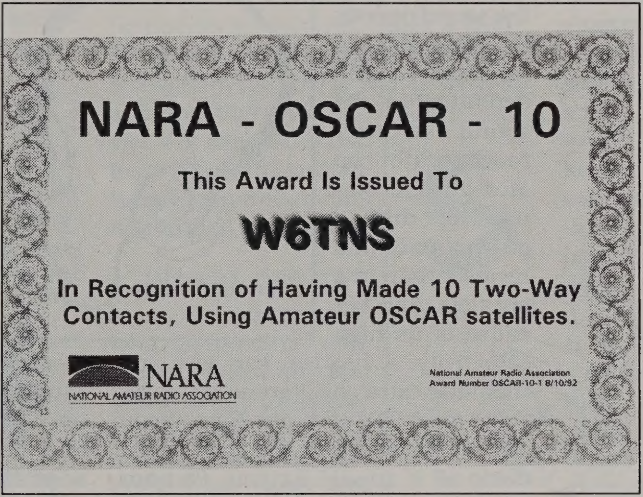
Here are a couple of clues to help you understand this point. First, a number of the Russian Satellite (RS) "robots" have uplinks in a certain Novice band. Secondly, there is nothing to prevent a Novice (or any licensee for that matter) from having another Amateur "gateway" or relay his signals from a legitimate Novice frequency over to an Amateur satellite network or uplink. This is being accomplished in a number of areas of the country now and is quite acceptable for the *OSCAR-10 award.* You may wish to examine the 1992 Public Service column of *QST* for further details on how local satellite gateways are being effected. It's not only a lot of fun, but it offers an excellent opportunity to serve the public by way of your Amateur Radio license as well!

To obtain the very striking NARA *OSCAR-10 certificate* or plaque, you must submit proof—in the form of photocopies of QSL cards—of 10 or more Amateur Radio contacts that utilized any number of OSCAR satellites for some portion of each contact. There are no restrictions as to the modes or frequencies used, provided that your license class allows them to you, and that you have otherwise obeyed all laws and rules that apply. For QSL cards that do not indicate OSCAR use, separate written explanations are required. In the case of forwarded messages that utilized OSCAR satellites, inclusion of the forwarding path showing LUSAT or PACSAT-type headers will be sufficient to comprise the explanation. We're certain that you'll find the NARA Awards Committee to be very flexible and understanding, but the decisions of the awards committee are final, so if you are in doubt, we suggest that an extra contact or two be included, just to be safe.

As you become more familiar with the NARA awards program, you'll notice that many of your Amateur Radio contacts are applicable toward different combinations of awards. For example, if you happen to have 25 or more OSCAR satellite contacts, and if those contacts were made by using five watts or less, you are also eligible to apply for the *NARA QRP-25 award!* See the previous issue of the NARA *Communicator* for details on that intriguing award, and by all means, stay tuned for the other exciting certificate and plaque programs. Speaking of that, here comes another one now.....

The NARA RS10-1000 Award

In addition to the very exciting *OSCAR-10 award* that we're introducing in this issue, we're pleased to tell you about the National Amateur Radio Association's next award in the series—the *RS10-1000 award* and plaque program.



NARA - OSCAR - 10

This Award Is Issued To

W6TNS

In Recognition of Having Made 10 Two-Way Contacts, Using Amateur OSCAR satellites.

NARA
NATIONAL AMATEUR RADIO ASSOCIATION

National Amateur Radio Association
Award Number OSCAR-10-1 8/10/92

The NARA OSCAR-10 certificate/plaque.

The Award Committee feels that now is a particularly appropriate time to inaugurate this award! W6TNS' RS10 article (featured later in this issue) does a superb job of instilling excitement amongst newcomers to satellite operation. In a recent *QST* article correctly noted, RS10 is truly one of the "EASYSATS"!

Don's article points out that anyone with a Technician class license or higher can make contact with hundreds of other Amateur Radio stations by way of Russian Satellite 10. But, (surprise!) you don't even need an Amateur Radio license to obtain this particular NARA award. That's right, even Short Wave Listeners (SWLs) can strive for, and earn, the *RS10-1000* certificates, plaques, and endorsements. Here's how:

To obtain the absolutely beautiful *NARA RS10-1000* certificate or plaque, you must submit proof of having obtained 1000 points—in the form of photocopies of QSL cards—of five or more Amateur Radio contacts via the RS10 satellite. That goes for both licensed Amateurs and Short Wave Listeners as well. SWLs, of course, will need to obtain the QSL cards from one of the two Amateurs involved in each contact. In such cases, the QSL cards will be made out by the licensed Amateur, and addressed/sent to the listener with his/her name or SWL designation on it.

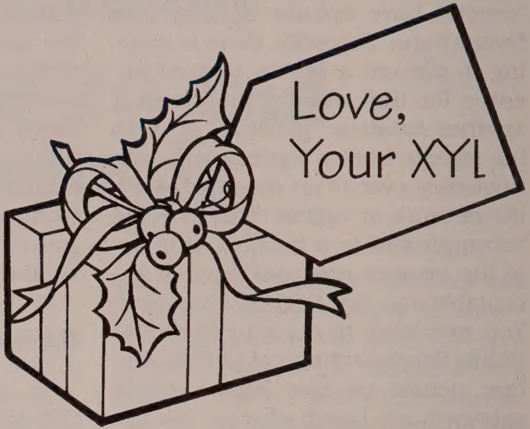
In other words, each legitimate (as determined by the NARA Awards Committee) photocopy is equal to 200 points, with a total of 1000 points being required for the basic award.

Gold leaf endorsements are available for additional increments of 1000 points each. There is no maximum amount of increments; if you can prove 100,000 points, fine! We'd be pleased to laden your certificate or plaque with however many endorsements you're capable of earning.

Incidentally, we're enthusiastically searching for photographs and short biographical information on any and all participants in the NARA Awards Program, so if you'd like to become rich and famous (well, famous anyway) we sincerely hope you'll consider sending in pictures of you and your shack in operation.

We're also anxious to learn of any suggestions you have for future NARA awards, certificates, plaques, and endorsements. Got some ideas? Send them along to the National Amateur Radio Association Awards Committee at 104 Park Road, Suite #6, West Hartford, CT 06119. ❑

The Six Most Useful Ham Accessories



IN THIS AGE OF Amateur equipment with astronomical specifications, and sometimes equally elevated prices, many hams plug along with equipment that's best described as rock-bottom. Savvy Novices and Techs spend some of their money at Amateur Radio flea markets. Skillful operators on a budget can knock out solid contacts and win awards just as easily as someone with a $3,000 rig.

What's the secret? Well, no one is going to deny that it's nice to own a shack full of top-notch gear. But this is often just plain wishful thinking, even at Christmas time. Fortunately, there are ways to get more out of a basic, run-of-the-mill, flea-market rig without spending a small fortune. The answer is in the accessories.

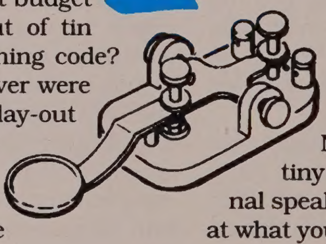
Here are six low-cost accessories—some of them priced at less than $50—that can give your operations a big boost. Naturally, no one needs all six. But you're going to find a few items that will prove invaluable. Maybe you'll find one under the tree!

1. HEADSET

At the top of the list is a first-rate headset. Weak signals can get lost in the QRM and QRN between a speaker and your ear. But a headset isolates you from your surrounding environment, directing your attention solely to the received signal. Furthermore, by bringing the sound directly to your ear, a headset adds definition to the sound. It's easier to separate two Morse code signals or distinguish a voice in a headset than in a speaker. And because of its high sensitivity, a headset can give you that little extra gain you need to hear those weak DX stations. Even if you already have a headset it may not be doing all it should for you. Perhaps it's an ancient model, loaded with distortion and producing masking due to ear fatigue. Is a new set of earphones inside that festive wrapping?

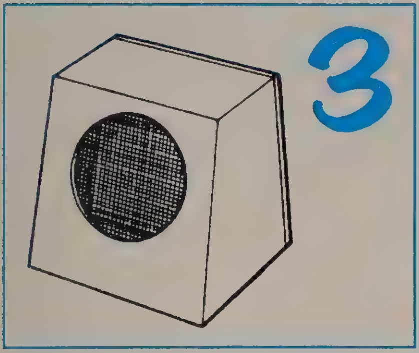
2. KEY

How about a key? Did you forsake Morse when you got your Codeless Tech license? Do you still have that budget model you made out of tin when you were learning code? Home-made keys never were designed for day-in, day-out use. Maybe someone gave you an old beat-up key, hoping it would mesmerize you into learning the code. Worn bearings and poor spring tension may be causing your fist to sound like a Martian. Even a good straight key can be a decided asset and the surplus Army J-38 still can be found at fleamarkets for a few dollars. Why not check into a modern high-quality key with a full range of adjustments? What about an electronic keyer for high speed and flawless characters? You can send at 35 WPM like all "real" hams, can't you? Or let's look at a good key from another angle. A Morse code contact with a pip-squeak DX station can really get the ham juices flowing again! There are lots of overseas CW hams virtually begging for a call on the 15-meter Novice band. Even if you consider yourself a two-meter terror, a key under the tree will make a hit.



3. EXTERNAL SPEAKER

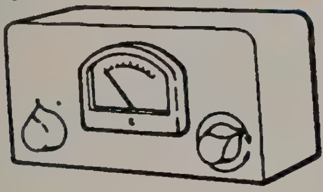
Have you hinted that you need an external speaker for your rig? Most ham radios have a tiny and tinny-sounding internal speaker. You would be amazed at what your handheld sounds like if



you plug an external speaker into the headphone jack. Signals and voices that previously have sounded muffled, will suddenly become clear and crisp with an external speaker. And for those who want to go "first cabin" they even make speakers that will only turn on when someone transmits a TouchTone(r) code to you. This is great for the XYL who doubts that all that chatter on the repeater is music to her ears.

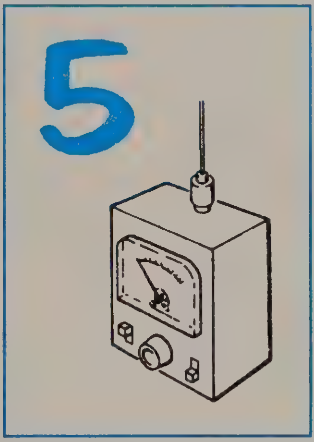
4. SWR BRIDGE

Some accessories aren't restricted to phone or Morse code. Those that improve a signal have universal value. Heading the list is a standing-wave ratio (SWR) bridge, a device that indicates when your antenna is adjusted for maximum output and how much of the output power your antenna will accept. By way of explanation, the amount of power an antenna will accept is determined by the impedance match between the transmission line and the antenna; the SWR is nothing more than the ratio between the antenna impedance and the line impedance. To insure that maximum power is transferred to the antenna system, the SWR must be maintained at a ratio as close to 1:1 as possible. An SWR bridge is the only low-cost, convenient means of measuring SWR. In addition, it can be left permanently in the transmission line, providing a continuous check on the condition of the antenna system and showing how well it's matched to your rig. Most SWR meters work all the way up to the two-meter band.



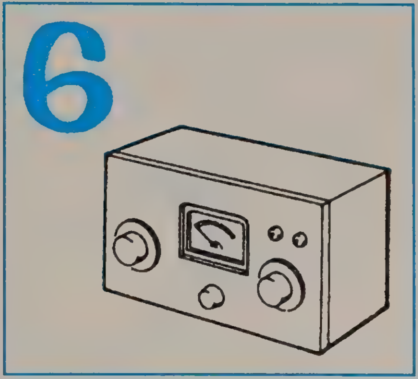
5. FIELD-STRENGTH METER

Still another handy accessory is a field-strength meter, a device that indicates relative RF power. The major advantage of a field-strength meter is for adjusting or checking an antenna's radiation. For example, a field-strength meter is indispensable when adjusting a directional beam for maximum front-to-back ratio or maximum forward gain (the twain don't meet). Obviously, something has to receive your signal in order for you to know whether your adjustments are correct. Since a field-strength meter indicates relative strength of the energy radiated by an antenna, this is the device for the job. Most field-strength meters handle anything from 80 through two meters.



6. ANTENNA COUPLER

An antenna coupler is a gadget that can match almost any antenna to any transmitter. Hams often assume that a megabuck ham radio will load into anything, but this isn't necessarily true. Further, transmitters with solid-state finals have output circuits that can load into only a narrow range of impedances. If you keep in mind that maximum transmitter-power output is obtained only when the transmitter is matched to the antenna system, you'll see the value of an antenna coupler. Since this is one item where it pays to purchase the best, it's wise to plan ahead for future requirements. Some deluxe couplers have built-in SWR bridges and a range of adjustments to match almost anything to anything.



Good luck when you search through that fireplace stocking! Happy Hanakuh, Merry Christmas and Feliz Navidad from all of us at The National Amateur Radio Association. ❏

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THE • ADVENTURES • OF

Dan & Burke

Santa Knows All

Dan and Burke were standing with the manager of Carlton's department store watching Santa Claus talk to the children. Santa sat back in a curtained recess on a throne of artificial ice and snow, and the children came up to him one at a time to sit on his knee and tell him what they hoped to find under their trees on Christmas morning.

"Watch this one," said Mr. Bixby, the store manager, with a smile of anticipation as a pretty little dark-haired, hazel-eyed girl tiptoed cautiously toward old Santa.

"Well, well," Santa boomed, scooping up the little girl and placing her firmly on his broad knee, "if it isn't little Carol! Aren't you the pretty one today?! I've been thinking about you, and I know exactly what you want; a big new doll just like the one you saw out there in the window. Somehow I've got a feeling you're going to find that cuddly doll right in front of your tree Christmas morning—but, Carol, you must promise me something."

"Oh, I will Santa, I will!" the wide-eyed little girl said eagerly.

"Well, you mustn't hit your brother over the head with this doll and break it as you did your other one," Santa said with a twinkle in his blue eyes.

"I won't Santa Claus; honest I won't," Carol promised as Santa set her back on her feet.

"And, Carol," Santa called as she was leaving, "you can tell your pretty mother for me that I'm glad she likes my voice."

Carol and a flustered, bewildered-looking mother made a quick exit from the store as Mr. Bixby turned chuckling to the boys.

"They can't figure it out," he said. "When you boys first suggested the idea to me, I never imagined it would work so well. And it is actually so simple. With that hearing-aid earphone concealed by his whiskers, no one would ever suspect Santa was listening on a little transistorized receiver. By the way, that miniature transistorized wireless transmitter is hidden so well even I can't locate it. Just where is it?"

"It's hidden inside that railing just at the point where each child waits his or her turn to talk to Santa," Dan explained. "As the parents coach their kids or chat with the other parents, the mike picks up wonderful clues for old St. Nick regarding Christmas wishes, past behavior, and so on."

"The word is spreading like wildfire," Mr. Bixby chuckled, "that Carlton's Santa Claus is the only real one. He knows everything. In fact, boys, I'm so pleased that I'm going to give you a little bonus. Our agreement was that you were to receive fifty dollars for building and renting us the equipment. Well, here's thirty-five dollars for you, Burke; and here's the same amount for you, Dan. I'm not even going to wait until we're through with the equipment. You boys may want to do a little shopping of your own with that money before Christmas Eve."

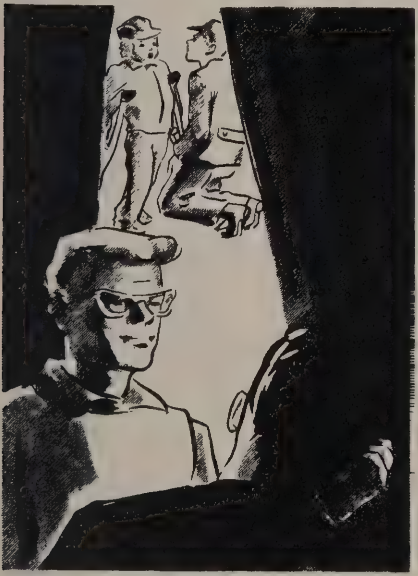
"Man," Dan exclaimed, after they had expressed their thanks and Mr. Bixby had left, "now we can buy that combination IC and transistor tester we've been wanting!" Before Burke could answer, Santa Claus rose from his throne and announced he had to go and feed his reindeer but would be back in half an hour. A curtain was drawn across his alcove, and he disappeared from sight. An instant later, though, Burke saw him beckoning from the open door of a storage room.

"I was wondering if you boys could turn up the volume on that receiver a bit while I'm out to lunch," he suggested. "The store is getting noisier, and it's a little hard to catch what the children say at times. Just boost it up a bit, please."

Dan and Burke proceeded to the curtained-off alcove; and Burke picked up the receiver, placed the earphone in his ear, and reached into his pocket for a screwdriver with which to adjust the volume. Suddenly he paused and started listening intently. Then he walked over and parted the curtain a little so that he could see the spot where the hidden transmitter was located. Dan, looking over Burke's shoulder, saw a little boy of four or five leaning back against the railing while another boy of ten or eleven, obviously a brother, knelt in front of him talking earnestly. Burke removed the earphone from his ear and turned up the volume of the receiver so that Dan could hear the conversation between the two boys out in the store.

"But, Timmy," the older was saying, "we ought not wait for Santa to come back. The folks will be worried about us. Anyway, I don't think you should ask Santa Claus to bring you that electric train. You don't understand, but seventy-five dollars is an awful lot of money. What with Dad being out of work for so long and everything, maybe we shouldn't expect too much for Christmas this year."

"Why, Ronnie?" the little blond-headed youngster asked. "You think Santa only brings presents that cost a lot to little boys with rich parents? If that's so, what's the use of being Santa? That's not the way it is. Santa Claus can do anything. When I tell him I want the train so Daddy and I can play together and Daddy will forget how bad he feels, I just know I'll get it. When Daddy was a little boy, he wanted an electric train more than anything, but he never got one. Don't you see that I've just got to stay and talk to Santa?"



Little Timmy stood up straight, and for the first time the boys saw the crutches under his arms and caught the glint of metal braces on his slender legs.

Dan smiled wryly as he answered the question in Burke's eyes. "Bye-bye IC and transistor tester," he chanted softly.

"I knew you'd be soft-hearted and soft-headed enough to say that," Burke exclaimed, digging an affectionate elbow into the ribs of his lanky friend. "Let's go hunt up Mr. Bixby and buy that train right away. Then we must brief Santa a little. Finally we'll follow the kids home and see where they live. It must be close because the little fellow couldn't walk too far."

The boys found Mr. Bixby talking with Santa Claus, who was delicately bending a toothpick through his whiskers in a most mortal manner. Constantly interrupting each other, the boys explained to the store manager what they wanted to do.

Now Mr. Bixby had not become the head of Carlton's Department Store by being an old softy, but even he was not immune to the Christmas spirit, and there was something about the way the two boys responded to the appeal of little Timmy that touched him.

"I've an idea, boys," he said. "The store and its employees build up a fund every Christmas to help needy cases. How would it be if you two kept the money that you've earned and let us take care of this for you?"

Dan and Burke exchanged glances, and then Dan spoke up for both of the boys:

"We appreciate the offer, Mr. Bixby, but if you don't mind we'd like to do it ourselves. You see, up to now Burke and I have almost always been on the receiving end of things, everyone has done things for us. I guess it's about time we started trying to do a little something for others. It makes us feel sort of grown-up and good inside."

"Okay, okay!" Mr. Bixby said hurriedly, clearing his throat; "but you mustn't be selfish about this. Let us help a little, too. The store will sell you the train at our cost price, and that will leave enough over to buy a nice present for Ronnie."

The boys quickly agreed to this proposal, and Santa took his place on the throne. The curtain was pulled back, and Timmy started toward him at once, swinging through his crutches.

"As I live and breathe and harness my reindeers, if it isn't my little friend, Timmy!" Old Santa exclaimed, carefully gathering up the little boy. "I've been watching for you because I know just what you want."

"Really, Santa?" The little curly-headed boy asked, his blue eyes open wide.

"Unless my elves have been telling me wrong, it's an electric train; and I can just see you and your daddy playing with it under the tree on Christmas morning," Santa said dreamily, with his eyes closed.

"You hear that, Ronnie; you hear that?" Timmy shouted, bouncing up and down on Santa's lap in excitement.

"And," Santa continued, "I wonder how Ronnie would like a fine transistor radio kit that he and his daddy could put together?"

The boys could see Ronnie nodding his head up and down so hard that his sock cap slid down over his eyes. For the moment, all the wordly cynicism of late childhood had deserted him.

Timmy was so excited he could not sit still; so Santa carefully set him on his feet and watched he and Ronnie making their way down the aisle. If you watched very, very closely, you could have caught a secret sign of mutual approval, made by circled thumb and forefinger, being exchanged by Mr. Bixby in the balcony, Santa Claus, and two boys who casually followed Ronnie and Timmy through the crowded store that night.

One of the boys was short and plump and dark, the other with glasses was tall and blond and athletic; but on the face of each was exactly the same happy, contented, "Christmassy" smile.

Merry Christmas, John Frye, wherever you are! ❑

Dan and Burke is based on a storyline created in 1954 by John Frye, W9EGV. The boys are the sons of John's original characters, Carl and Jerry.

John Frye is no longer with us. But while he was alive, John was an avid Amateur Radio operator who wrote about young people—for young people.

It's doubtful that anyone could make John's stories more interesting or improve on his words. We'll settle for giving them a 1990s twist.

If you would like to learn more about becoming an Amateur, or helping a young person become an Amateur, write to the National Amateur Radio Association, PO Box 598, Redmond, WA 98073-0598 or call #1-800-468-2426.

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LETTERS

THINGS ARE LOOKIN' UP!

Dear Don:

I sure appreciate your editorial. However, at my QTH I've found that the "old-timers" and new influx of hams coexist wonderfully. There's been a steady rise in the membership of the local radio club, thanks to Codeless Techs (or as a pre-Codeless Tech friend of mine calls us, Technicians-minus!) Most of our traffic is handled on two meters and we've been able to jump right in and help. The net meets on 147.195 each evening. The club has no shortage of people signing up to work communications support for local events. As a group we Codeless Techs have shown we're willing to handle the civic responsibility of being hams. As a result we're being accepted very well by the large population of "old-timers" we have here in central Virginia. We're working great together!

73 Lewis Gregory, KD4QDP

Dear Don:

Thank you for sending me a copy of the *Amateur Radio Communicator.* As a new Technician ham, I read with interest your article on Second Class Amateurs. I found that in the Minnesota area I have been accepted into the ham community with few problems. I have attempted to become a good operator by getting involved in public service activities. We are granted a license from the FCC, in part, to be able to provide public service communications. It's fun and a good way to meet folks on two meters. Being polite and following good operating practice will also make friends. To sum it up, just getting the license and buying a two-meter rig doesn't get you into ham radio. You need to meet people, find common interests, and get involved.

Sincerely Larry Larson, N0SUO

Dear Don:

I wouldn't say that I am entirely representative of a young ham (39-years old) but I will tell you that I have purchased, built and traded over $7,000 worth of equipment for six-meter, two-meter and 70-cm operation since getting my ticket in May. All my efforts are going toward the continuation of VHF and above. I would like to operate HF in my lifetime, after exploring the newer technology, but if it dies with those that occupy it before then, so be it. There are many others like myself that feel alienated by the treatment they have received as newcomers, and by the antiquity of Morse code as a requirement of your technical knowledge to work the HF bands. As I talked all over Europe and the United States on 70 cm (OSCAR 13) this morning, I heard the echoes in my head from the hams that said *my "Tech-Lite" license was a learner's permit for operating on the back roads.*

73, David Little, KD4NUE

WAS IT SOMETHING I SAID?

Don:

I got a copy of your rag today. Don't know what to think of it yet! The ARRL, W5YI, WB6NOA and yourself are trying to screw up the Novice program by taking Novice testing away from the Novice instructors. "Well hell, if we get rid of all them Novice instructors, we can sell more books." It sure looks to me like that is the game plan. I can tell you now if Novice testing is placed into the VEC program, the ARRL can stick my VE badge where the sun don't shine. On second thought, I'll cut it up so each of you can have a piece!

Sincerely, George "Ed" King, K8OT

That's about as "sincere" as they come, Ed! No one suggests "taking Novice testing away from the Novice instructors." But the rampant cheating in the two-Amateur testing program makes it essential to bring it under the wing of the VECs. Sorry to lose you as a VE, but I cannot understand why you would not become part of a VE team and continue to test Novices.

Reading, 'Riting and Radio

by Carole Perry, WB2MGP

CHILDREN ARE OUR MOST important natural resource. We who are involved in the education process are constantly looking for new ways to stimulate and hold the attention of young people in our classrooms. A course that does just that is "Introduction to Amateur Radio." For the past 12 years I have been teaching this program to 6th, 7th and 8th graders at Intermediate School 72 in Staten Island, New York.

The course is built on the premise that every student can be motivated to do better in his or her schoolwork via the fun of Amateur Radio. Amateur Radio allows any teacher to have an inter-disciplinary approach to learning for all students. Children of all different backgrounds and abilities can master skills and find success in a classroom setting while having fun. The purpose of the course is to make sure children leave the room with a new sense of self-esteem and learn in a comfortable setting and a challenging environment.

Language arts, geography, science, and math skills are taught everyday through the motivational "tool" of Amateur Radio in the classroom. One of the most exciting times of the week for us is when I conduct the "CQ All Schools" net with Gordon West, WB6NOA. Every Tuesday and Thursday at 12:30 EST on 28.303 MHz, Gordon and I invite school kids and enthusiastic ham radio operators to join us on the net. The kids love to meet other school children on the air. We often set up pen-pal exchanges between different schools. This year we did five video tours of our school that we sent to other schools in different parts of the country. The kids really enjoy seeing what other schools look like, and getting to see what the boys and girls they've spoken to on the radio, look like.

Contact on the CQ All Schools Net led to meeting at the Johnson Space Center with astronaut Jay Apt, N5QWL

We've had some special contacts over the years. Amongst the favorites of the children are the wonderful talks they've been able to have with some of the astronauts. The children in my class really felt special that someone as important as an astronaut would take the time to check into their net and answer all their questions. It's an extraordinary experience for us all. I've now developed an entire unit on Space Travel and Communications based solely on the student's questions and discussions with the astronauts. It's stimulated a new interest in the space program for these children.

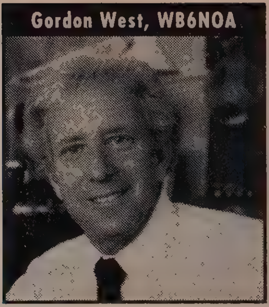
(Continued on page 21)

Book Review—*HOW TO GET STARTED IN QRP*

NARA has done it again with another "winner" in its expanding "How To" series of books called *How To Get Started In QRP*. QRP is an adaptation of the Amateur Q-code that has come to mean low-power (less than five watts transmitter-power output operation. The 144-page handbook was written by popular author Dave Ingram, K4TWJ. It reveals the secrets of "QRP-DX and develop large contest scores.

Dave explains the subject of QRP in terms that are easily understood by beginners but still of interest to those experienced working QRP. He covers subjects such as an overview of QRP, operating tips, commercial equipment, homebrew, accessories, antennas, and power sources for QRP rigs. A chapter is included that discusses QRP operation on the VHF and UHF bands occupied by Technicians. The chapter on DXing with QRP is just as applicable for stations operating conventional 100-watt radios. His chapter on antennas will have universal interest. K4TWJ introduces a number of unique antennas, such as the end-fed dipole, that work just as well at any power level.

We liked *How To Get Started in QRP* for its breezy style and information-packed content! "QRP" is only $9.95. Check with your dealer to see if it is in stock. If not, it can be ordered directly from the **National Amateur Radio Association** by adding $2.00 shipping and handling. ❑



Gordon West, WB6NOA

Handheld Battery Considerations

by Gordon West, WB6NOA

> Handheld two-meter and two-meter/440-MHz transceivers are a fun way to get started in ham radio.

Charge your VHF handheld at least eight hours before using it for the first time.

HANDHELD TWO-meter and two-meter/440-MHz transceivers are a fun way to get started in ham radio. The little handheld transceiver will give you instant access to local repeaters as soon as your new call sign arrives in the mail. Virtually every active Amateur Radio operator owns a portable handheld transceiver to stay in touch with all of the excitement on the airwaves.

All handheld transceivers include a rechargeable battery pack. A battery is usually defined as a group of cells connected in series or in parallel. The rechargeable pack on your handheld usually contains up to eight individual "AA" nickel cadmium cells, soldered together in series, internally encapsulated within your "sealed" battery pack. Your new handheld transceiver will also include a small wall adapter that will trickle-charge your pack up to full capacity overnight. Most nickel cadmium batteries may be recharged over and over again for approximately three years of use.

HEY—YOUR BATTERY PACK IS DEAD!

When you open up your brand new handheld, you probably want to start receiving all of those local repeater channels immediately. But if you don't charge your battery pack overnight, your initial reception will only last for a few seconds. Unless your dealer has substituted a freshly charged battery pack for the one that comes with your equipment, the "gastank" in your new battery pack is on empty.

One reason for a new unit with a dead battery is that nickel cadmium batteries will self-discharge over a period of a couple of months time. If you look at the date that your equipment was actually manufactured, chances are it's been more than six months since the little beauty took its trip from Asia to your local dealer's shelf. I have also been told that the batteries are not charged when they leave the manufacturer because air shipments may not allow the hazard of *hot* batteries in the cargo hold. So for whatever reason, don't expect your brand new handheld to work on that brand new battery pack until you give it at least an overnight charge.

This unit has a low battery indicator that displays an "L" on the screen.

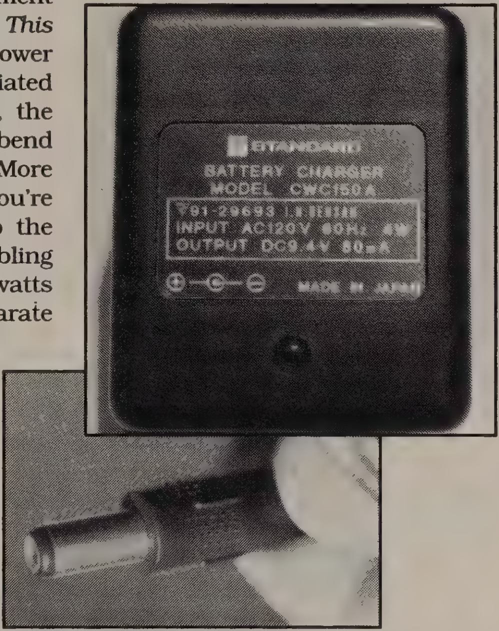
Most handhelds are shipped with a sealed nickel cadmium battery pack rated between seven and nine volts. This is the normal operating voltage for a handheld transmitter to run at medium-power output. The battery included with your equipment probably runs your handheld at about three watts output. This is plenty for most of your simplex and repeater operations. In fact, you may find that you can operate quite nicely to other nearby stations with power levels under one watt.

New Amateur Radio operators may think that five or six watts output will make a substantial improvement to their communications range. *This is seldom true.* While more power output will increase your radiated signal on a line-of-sight basis, the increased signal strength won't bend any further over the horizon. More "steam" won't help you a bit if you're not on a line-of-sight basis to the other station or repeater. Doubling your power from three to six watts output will also require the separate purchase of an optional "high power" 12-volt battery pack. These optional "high-power" output battery packs can run up to $95. You also need to add another $75 for the drop-in charger. This device is necessary to put out enough current to charge the optional higher power output battery pack.

So don't get all excited about going for more power output with a 12-volt pack until you really get your feet wet on the airwaves with your new handheld.

If you really feel compelled to buy something optional with your handheld, do consider a higher capacity battery pack that runs at approximately the same voltage as your included battery pack. Most manufacturers include a 7- to 8.5-volt battery pack rated at 600 mAh capacity. A 600-mAh pack will last about six hours for normal radio use. If you purchase an 800 mAh or 1,000 mAh optional battery pack, you can get as much as eight to ten hours of continuous use before it needs recharging. And since you have purchased an optional pack, while you are using one battery, you can charge the other. Just make sure that the battery charger will work with a higher capacity, same voltage, battery system.

The nickel cadmium battery pack enjoys constant exercise. Like an athlete, if you do nothing but feed it all day, and never exercise it, it won't do well during a strenuous workout. But if you regularly use the pack, and run it almost all the way down to depletion, and then let it charge up overnight, it should last for at least three years. And the pack should certainly perform for at least half a day of regular handheld use. But if all you do is keep your spare battery pack on constant trickle charge, the first time you go to use it, it may only play for about an hour or so. This is not an irreversible problem. If you cycle your nickel cadmium battery pack up and down from discharge to charge, and back to discharge, you should exercise your spare battery pack back to life. In the commercial radio service, big companies with hundreds of handhelds may use battery conditioners to regularly exercise handheld sets sitting around, waiting for deployment. But there is a better way for frugal Amateurs. Simply turn on your handheld, let it set for 24 hours and the battery will die naturally, which is a much less expensive way to go.



Charge your handheld only from the charger supplied. Don't improvise!

Watch out for a short circuit if you should carry your handheld spare battery in your pocket with loose change. Anything metal across the contacts could short out the pack, and cause it to get red hot within seconds. You could wind up with an electric cigarette lighter blazing away in your pocket!

On the horizon, is the nickel-metal hydride battery that may offer more milliamp hours of capacity, for the same weight and size, as traditional nickel cadmium batteries. But these are still a year off from inclusion with ham radio handhelds. For the time being, your nickel cadmium battery will serve you well if you exercise it regularly, and go for milliamp-hour capacity, rather than high-voltage quantity. Personally, my most favorite battery pack is 7.4 volts at 600-milliamp hours, with a 7.4 volt 1,000-milliamp hour battery for extra long life.

73 from Gordon, WB6NOA ❑

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You Can Communicate Through A Satellite For Less Than $100!

by Donald L. Stoner, W6TNS

RS10 Satellite

SOMETIMES, AMATEURS seem to be totally enchanted with technology. While this is often beneficial, and leads to new developments, it can also inhibit newcomers—particularly if the technology is expensive to acquire.

This is certainly true when it involves the technology of Amateur Radio satellites. We talk about geosynchronous *birds* or communicating via **OSCAR** (*Orbital Satellite Carrying Amateur Radio*) from 35,000 km above the earth, yet ignore the simple devices like the **DOVE** (*Digital Orbiting Voice Encoder*).

As a result, beginners think that they need expensive multi-mode, multi-band transceivers and dual-band, azmuth/elevation tracking, cross-polarized antenna systems, just to work the birds. If you doubt this premise, ask any newcomer for an opinion of what it takes to communicate via satellite.

BUDGET SATELLITE COMMUNICATION

NARA is here to tell you that *getting started doesn't have to be expensive*! Did you know that you can work hundreds of other stations via a Russian satellite? You can do it for less than $100, assuming you already have a two-meter handheld transceiver.

Russian Amateurs, by necessity, tend to be very pragmatic. Like most Technician hams, very few Russian hams can afford the necessary "goodies" to work the more sophisticated satellites. As a result, the Russians prefer ham satellites that can be used with readily available Russian ham gear. They have "piggybacked" a couple of easy-to-use ham radio transponders on several of their navigation satellites. This article is concerned with the transponder on COSMOS 1861. The ham portion of this satellite is called RS10/11. In Russian, the "RS" stands for "radio sputnik" or *radio traveler*.

NARA is here to tell you that getting started communicating via satellite doesn't have to be expensive!

Since I have never heard a signal from RS11, I assume it is a spare in case RS10 "conks out." This article discusses operating via the RS10 transponder. I'll refer to that platform—rather than the combined RS10/11—in the following material.

WHAT'S A TRANSPONDER?

A transponder is something like a two-meter repeater, with which you are all familiar. It receives a signal on one frequency and retransmits it on another frequency. There are three operating modes for the transponders on RS10 called **K, T,** and **A**. The first two modes require that you transmit on 15 meters. Since some of you may not have a license for this band, let's concentrate on "mode A." You all have a license for two meters, right?

The RS10 transponder actually picks up *a band of frequencies*, not simply a single frequency like a repeater. RS10, operating on "mode A," picks up signals (or more correctly has a *transponder input*) on two-meters between 145.860 and 145.900. Thus the reception band or input is 40-kilohertz (kHz) wide. When the RS10 satellite is within range, any signal received within this band will be linearly retransmitted on another 40-kHz-wide band on 10 meters. This is the *transponder output*. This band is between 29.360 and 29.400 MHz. *Linear retransmission* means that a two-meter signal on 145.860 will appear on 29.360, 145.870 will be 29.370, 145.880 will be 29.380 and so on.

Russian hams, like new Technician class Amateurs, cannot afford high-powered two-meter equipment. Thus the Sputniks are designed to be very sensitive. They can actually hear an earth-based signal originating from a one– or two-watt radio!

RS11 is a second transponder on the same COSMOS satellite platform. This transponder is silent but is designed to receive between 145.910 and 145.950 on two meters and retransmit this band between 29.410 and 29.450 on 10 meters. For your information, the Russians also have another satellite, RS12/13, but its transponder input is on the 15-meter band. The advantage of a 15-meter input is that one can contact the satellite even when it is beyond VHF line-of-sight range. If the "skip is in," it can hear your 15-meter signal even though it is thousands of miles away.

The accompanying chart, *Figure 1*, shows the RS10 transponder frequencies for modes A and K. As mentioned earlier, RS10 seems to be permanently set on mode A.

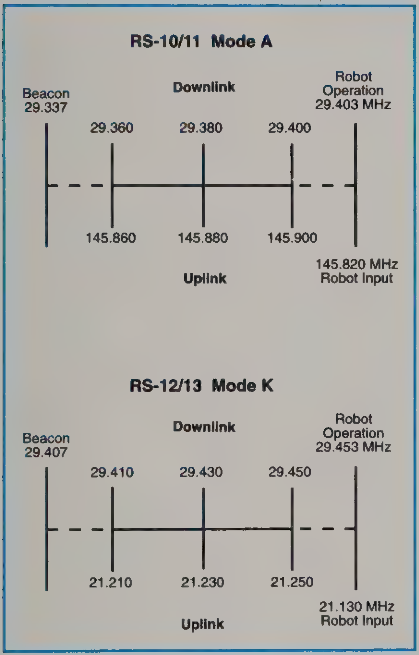


Figure 1.

A WORD OF CAUTION

Even though you can contact the Sputniks with a two-meter handheld, **don't be tempted to do this on FM**. Your signal could wipe out a wide band of frequencies and interfere with many stations. Also make sure you don't have the subaudible (CTCSS) "private line" tone turned on. It will also cause the radio to FM, rather than transmit a pure CW signal.

If you can't use FM, how do you "talk" to the satellite with your handheld? Simple! *You do it on CW.* I know what you are thinking. This is an evil NARA plot to seduce you into learning the code and becoming proficient at it. Not at all! If you have a computer, let it do the work for you. In an upcoming issue of *The Amateur Radio Communicator*, we'll show you how to make your IBM computer clone receive and send CW, even if you don't know a single character of Morse! However, in this issue, let's concentrate on getting you "up and running" on RS10.

LISTEN FOR THE BEACON

You'll notice, in *Figure 1*, there is a "beacon" frequency of 29.357 MHz listed for RS10. When the satellite is within range, you'll hear a CW identification signal transmitted on this frequency. You can tell from the strength of this signal how successful you will be contacting someone via the satellite. If the beacon is down in the noise, it is unlikely that RS10 will hear your one– or two-watt signal. When it passes over you, the 10-meter receiver practically jumps off the desk due to the strong signal. You can often key the transponder with a "rubber duck" antenna on the handheld, even inside your house!

TALK TO THE ROBOT

Speaking of CW, I have to tell you about a nifty feature of RS10. It's called the *robot*. RS10 has another single-frequency input at 145.820 MHz and an output frequency of 29.403 MHz for the robot. The robot is capable of receiving your CW call and responding to you just like a human. Let's say you make a CW call on 145.820 such as:

"RS10 DE W6TNS AR" (RS10 from W6TNS, go ahead) you might hear the response:

W6TNS DE RS10 QSO NR 544 OP ROBOT TU USW QSO NR 544 73 SK

If the robot does not understand your call, it may ask for a repeat by sending QRM (interference), QRZ (who are you?) or RPT (repeat). Your contact with the robot should be at least 13 WPM and the robot will even adjust its sending speed to be the same as yours!

If you make a successful contact with the robot, you can get a confirmation by sending your QSL to:
Radio Sport Federation
Box 88
Moscow, Russia

How's that for an out-of-this-world contact?

WAIT A MINUTE!

"All this sounds great, but I don't have a CW jack on my handheld," I hear you saying. Of course you don't, but you *do* have a push-to-talk circuit. This can be hooked to a telegraph key (see *Figure 2*). Your keyed signal may be a bit "chirpy" but there is a simple solution if you have this problem. We'll talk about the solution in a subsequent issue. For CW operation, you'll need a key and a mini-plug of the correct size to insert in the microphone jack of your handheld transceiver. The plug should automatically short out the microphone input so the transmitter will not pick up any room noise. Make sure it does or you probably will not be able to key the satellite.

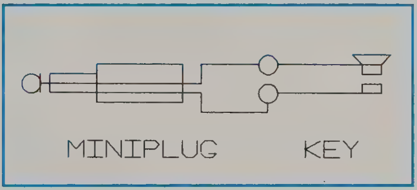


Figure 2.

HOW ABOUT RECEIVING?

This is where the majority of your $100 is going to be consumed. You'll need a receiver that can cover the upper end of the 10-meter band. You can easily pick up an old ham receiver or a modified CB rig for $50 or so. If you can borrow a suitable receiver, so much the better. That will reduce your out-of-pocket expenses considerably. Remember, the receiver must cover the 29.0 to 29.5 portion of the 10-meter band and it must have a beat-frequency oscillator (for CW reception) or be capable of SSB reception.

AREN'T ANTENNAS EXPENSIVE?

Depends on how you buy them. The beginner doesn't need a rotary beam antenna. Without a tracking program for your computer, you won't know exactly where the satellite is located or where to point the beam antenna. The solution? Use a non-direction vertical ground-plane antenna.

For 10 meters, I use a cut-down CB ground-plane antenna. I got it for free by offering to take it down off the neighbor's chimney at "no charge." The previous owner of the house was a gung-ho CBer (always ran a clean operation, by the way) who left the antenna on the roof when he sold the house and moved. I cut 12 inches off each of the four radials and the vertical whip. I should point out that I wanted the antenna tuned to 28.4 MHz in the middle of the Novice/Tech-Plus voice subband on the low end of 10 meters. I recommend you be a bit more precise, particularly if you are not yet licensed to operate on 10 meters.

As you recall from your Technician test, the formula for a half-wave dipole is 468 divided by the frequency in megahertz. For an optimum dipole on 29.4 MHz, the length should be approximately 16 feet. But that measurement is for a half-wave and the elements of a ground-plane antenna are each a quarter wavelength. Thus, the radials and the vertical should each be 8-feet long, no matter what they originally measured.

WHAT ABOUT TWO METERS?

Here we are going to get very crafty. Make a trip to your radio store and buy an SO-239 chassis-mount coaxial-cable socket. They cost around $1.50. Sometimes you hear them referred to as "UHF" connectors although they should not be used at frequencies above 300 MHz (the low end of the UHF band). Also swing by the hardware store and buy six feet of #14 gauge solid copper electrical wire.

Now examine the connector. Note that there is a square-mounting frame around the circular center and there are four mounting holes in the frame. Your assignment is to beg or borrow a heavy duty soldering iron and attach four 19-inch radials straight out at right angles to the four corners of this frame. Once the frame of the coax connector cools (this is very important!), bend the copper wires down at a 45-degree angle. Finally, solder a fifth length of the #14 copper wire straight up from the center connector. You have just made a 145-MHz ground-plane antenna that looks somewhat like the accompanying drawing.

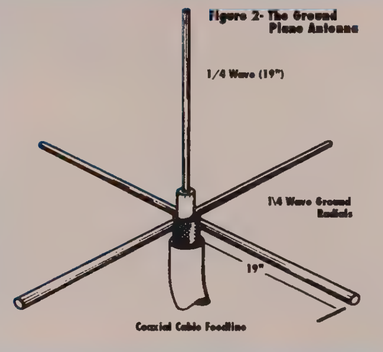


Figure 2- The Ground Plane Antenna

WHAT ABOUT THE COAX CABLE?

You are going to need a transmission line to connect these two ground-plane antennas to your equipment. Normally, I'd caution you against messing around with used coax, but we are on a tight budget for this project. Use any RG-8 or 11 (big diameter) or RG-58 or 59 (smaller coax) you can scrounge or buy for cheap.

MOUNTING THE ANTENNAS

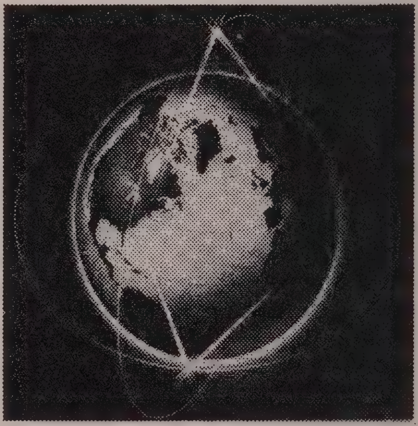
The antennas should be mounted outside, clear of obstructions and they should be mounted as high as possible. Don't forget that two meters is still a **line-of-sight** band. Even though you can hear the satellite beacon, indicating that RS10 is within range, that doesn't mean it can hear *your* two-meter signal. If you live on the east side of a hill, and the satellite is west of you, it is doubtful that your two-meter signal will be repeated by the satellite transponder. Even though two-meter signals bounce off hills and buildings, a reflected signal is probably too weak to be heard by the "birdski."

SATELLITE TRACKING PROGRAMS

You need to know where the satellite is and when it can be expected within range of your location. You generally establish this information with a satellite tracking program. There are lots of them available. I've spent "mucho bux" buying public domain and shareware satellite tracking software, only to find that the program was not satisfactory or was no longer supported. I finally bit the bullet and purchased the *InstantTrack 1.0* software from AMSAT-NA (Radio Amateur Satellite Corporation-North America). It tells you everything you ever wanted to know about where any satellite is located at any given instant, including azimuth and elevation. It has worked perfectly since the day I loaded it on my hard disk. For more information on this program, call or write AMSAT-NA, P.O. Box 27, Washington, DC 20044, telephone (301) 589-6062.

There is an easy and less expensive way to tell you (or more correctly, let you figure out) approximately when the satellite is in your neighborhood. In order to explain how this works, you need a quickie course in orbital mechanics. Visualize RS10 in a near-perfect circular *polar orbit*. Polar means that it swoops over both poles each orbit. RS10 makes 13 complete orbits during each 24-hour period. It takes approximately 105 minutes (one hour and 45 minutes) for one complete orbit to take place.

Picture, if you will, a gyroscope. RS10 is always traveling the path just described. It doesn't change its rotational speed or position with respect to the universe. But the earth is rotating beneath the satellite. Let's imagine you could look up at the appropriate time and see this



Russian marvel. Assume it is traveling from south to north. Approximately 53 minutes later, someone at the opposite point on the other side of the earth could look up and see the "bird" traveling from north to south. In another 53 minutes, the orbit is completed and the satellite once again passes near your location traveling south to north.

But wait a minute!! The earth has rotated during the 105 minutes that it took for one orbit to occur. The satellite is no longer overhead but, rather, the orbit track is to the west of your location. You can probably still hear its transponder beacon (if the orbit keeps the satellite within line-of-sight), but the signals will be weaker because of the increased distance between it and your location. Take a look at the map in *Figure 3*. I've drawn three typical tracks over the United States. Imagine the satellite following one of these tracks.

Here's where things really get fascinating. A half day later, the earth will have rotated sufficiently so that you are now the guy standing on the "opposite side," that I mentioned in the earlier example. If you look up now, you will see the satellite traveling from north to south.

A polar orbit satellite will be within radio range of every point on the surface of the earth at least twice a day. COSMOS 1861 includes a downed aircraft receiver (121.5 MHz) for emergency locator transmitters (ELTs). By using triangulation with the platform for RS12/13 (COSMOS 2123, that also has an ELT receiver), it is possible to locate a downed aircraft within a few miles anywhere on the earth.

RS10 will pass near your location once in the morning and once in the evening. In the morning, the satellite will be moving from south to north and the opposite direction in the evening.

But the satellite *precesses*. This means that if it is overhead on day one, the *same orbit* will be about 1,000 kilometers to the west of you on day two. As the orbital track moves away to the west, the track to the east moves closer to your location.

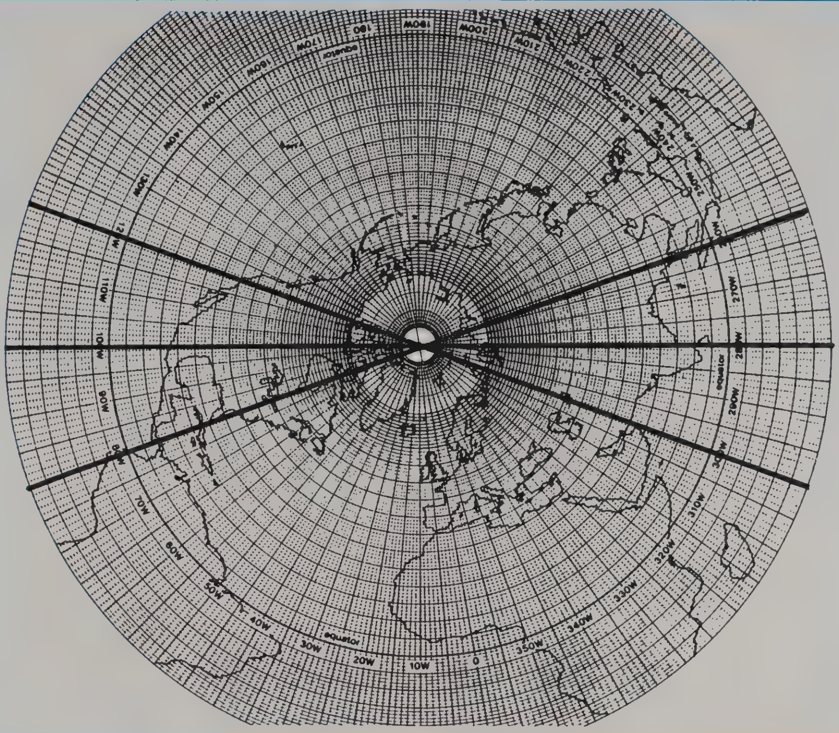


Figure 3.

ARE-10
The Silencer

- Eliminates the conversation you don't want to hear
- External Speaker
- Selective Call
- 2-, 3- and 4-digit DTMF Decoder
- Call Indicator
- Works with any FM radio
- Small size: 3"W x 4-1/4"D x 4-3/8"H

ARE-20
DigiTalker

- Talking Frequency Counter
- Works with any VHF/UHF handheld
- Announces the transmit frequency in voice
- Size: 5-1/4"W x 4"D x 1-1/2"H
- Battery Operated
- No connection to the radio required

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[redacted]

SO WHERE'S THE SATELLITE?

Earlier I promised you a simple way to figure that without any orbital prediction program. Take a look at *Figure 4*. This listing is based on a typical location in Kansas, the approximate center of the United States. For each day, there are two listings, for a morning and evening pass. Each pass in *Figure 4* shows the city closest to Kansas that the satellite passes over. The time in UTC (Universal Time Coordinated, but GMT—Greenwich Mean Time—for us ole timers. No pun intended.) is for the point of closest approach to that city.

Look at the listing for December 2, 1992. The first time the satellite is overhead is at 3:47 UTC. Do you know how to convert this to your local time? UTC is six hours ahead of Central Standard Time (yes, Toto, that's the time used in Kansas). A UTC of 3:48 means that it is 3:48 in the morning in England where Greenwich is located. But Kansas is six hours earlier or 9:48 in the evening. If you live on the east coast (EST), the conversion number is five hours, it's seven hours for Mountain Standard Time for you folks in Colorado or eight hours where I live in Washington on the west coast. By the way, don't forget to subtract an hour from these numbers when you convert to daylight savings time.

Ok, we've got that out of the way and established that *RS10 will be almost overhead of someone in Kansas at 9:48 on the evening of December 1.* "Wait a minute, wise guy. When you started this example, you said look at the listing for December 2, 1992. Now you're saying it's December 1. What gives?" Gotcha! When we subtracted the six hours from UTC to get to Kansas, we backtracked over midnight, which took us to the previous day. Haven't I always told you that ham radio was a great way to learn mathematics?

Now we get to the complicated part. Let's say you live on the boardwalk in Atlantic City. The satellite passed over you on the previous orbit to the one shown in the chart, *Figure 3*. This occurred one hour and 45 minutes earlier or at 2:02 UTC.

Date	Time UTC	Reference City
01DEC	0318	Aurora, IL
01DEC	1418	Chattanooga, TN
02DEC	0348	Grand Island, NE
02DEC	1448	Texarkana, TX
03DEC	0419	Casper, WY
03DEC	1518	Hobbs, NM
04DEC	0303	Clinton, IA
04DEC	1403	Decatur, AL
05DEC	0333	Grand Island, NE
05DEC	1433	Sherman, TX
06DEC	0404	Billings, MT
06DEC	1503	Roswell, NM
07DEC	0247	Iowa City, IA
07DEC	1347	Florence, AL
08DEC	0318	Grand Island, NE
08DEC	1417	Sherman, TX
09DEC	0348	Billings, MT
09DEC	1448	Las Cruces, NM
10DEC	0232	Des Moines, IA
10DEC	1332	Memphis, TN
11DEC	0302	Rapid City, SD
11DEC	1402	Wichita Falls, TX
12DEC	0333	Great Falls, MT
12DEC	1433	Las Cruces, NM
13DEC	0217	Des Moines, IA
13DEC	1317	Pine Bluff, AR
14DEC	0247	Rapid City, SD
14DEC	1347	Abilene, TX
15DEC	0318	Great Falls, MT
15DEC	1417	Tucson, AZ
16DEC	0201	Council Bluffs, IA
16DEC	1301	Pine Bluff, AR
17DEC	0232	Rapid City, SD
17DEC	1331	Lubbock, TX
18DEC	0303	Great Falls, MT
18DEC	1357	Great Falls, MT
19DEC	0146	Sioux City, IA
19DEC	1246	Hot Springs, AR
20DEC	0216	Casper, WY
20DEC	1316	Hobbs, NM
21DEC	0101	De Kalb, IL
21DEC	0248	Missoula, MT
22DEC	0131	Sioux City, IA
23DEC	0201	Billings, MT
23DEC	1301	Hobbs, NM
24DEC	0045	Clinton, IA
24DEC	1326	Missoula, MT
25DEC	0115	Grand Island, NE
25DEC	1215	Sherman, TX
26DEC	0146	Billings, MT
26DEC	1245	Roswell, NM
27DEC	0030	Iowa City, IA
27DEC	1130	Florence, AL
28DEC	0100	Grand Island, NE
28DEC	1200	Sherman, TX
29DEC	1230	Las Cruces, NM
29DEC	1235	Acapulco, Mexico
30DEC	0014	Cedar Rapids, IA
30DEC	1114	Memphis, TN
31DEC	0044	Rapid City, SD
31DEC	1144	Wichita Falls, TX
01JAN	1215	Las Cruces, NM
01JAN	2359	Des Moines, IA
02JAN	1059	Memphis, TN
03JAN	0029	Rapid City, SD
03JAN	1129	Abilene, TX
04JAN	0100	Great Falls, MT
04JAN	2343	Council Bluffs, IA
05JAN	1043	Little Rock, AR
05JAN	2226	Fayetteville, NC
06JAN	0014	Rapid City, SD
06JAN	1114	Lubbock, TX
07JAN	0958	Chattanooga, TN
07JAN	2328	Sioux City, IA
08JAN	1028	Hot Springs, AR
08JAN	2359	Rapid City, SD
09JAN	1058	Lubbock, TX
09JAN	2243	Elgin, IL
10JAN	0943	Chattanooga, TN
10JAN	2313	Sioux City, IA
11JAN	1013	Texarkana, TX
11JAN	2343	Billings, MT
12JAN	1043	Hobbs, NM
12JAN	2227	Clinton, IA
13JAN	1108	Missoula, MT
13JAN	2257	Grand Island, NE
14JAN	0957	Sherman, TX
14JAN	2328	Billings, MT
15JAN	1027	Roswell, NM
15JAN	2212	Iowa City, IA
16JAN	0912	Florence, AL
16JAN	2242	Grand Island, NE
17JAN	0942	Sherman, TX
17JAN	2313	Billings, MT
18JAN	1012	Las Cruces, NM
18JAN	2156	Cedar Rapids, IA
19JAN	0856	Memphis, TN
19JAN	2227	Rapid City, SD
20JAN	0926	Wichita Falls, TX
20JAN	2257	Great Falls, MT
21JAN	0957	Las Cruces, NM
21JAN	2141	Ames, IA
22JAN	0841	Memphis, TN
22JAN	2211	Rapid City, SD
23JAN	0911	Wichita Falls, TX
23JAN	2242	Great Falls, MT
24JAN	0936	Great Falls, MT
24JAN	2125	Fort Dodge, IA
25JAN	0825	Little Rock, AR
25JAN	2156	Rapid City, SD
26JAN	0855	Lubbock, TX
26JAN	2227	Great Falls, MT
27JAN	0740	Knoxville, TN
27JAN	2110	Sioux City, IA
28JAN	0810	Hot Springs, AR
28JAN	2140	Rapid City, SD
29JAN	0840	Lubbock, TX
29JAN	2025	Elgin, IL
30JAN	0724	Chattanooga, TN
30JAN	2055	Sioux City, IA
31JAN	0754	Fort Smith, AR
31JAN	2125	Casper, WY

Figure 4.

Subtract the five hours difference between UTC and EST and presto.... we learn the satellite passed overhead at 9:02 Eastern Standard Time. And what if you live in Santa Barbara, California? In this case you would add one hour and 45 minutes to time the satellite passed over Kansas. This gives the approximate time the next orbit occurs over the west coast. According to my handy-dandy calculator, this orbit occurs at 5:32 UTC. Subtract eight hours to convert from UTC to PST and we find that the satellite passes over Southern California at approximately 9:32 local time.

Should you start listening at 9:32? Certainly not, this is the time of closest approach. Depending on where you live, and where the satellite rises above the horizon, you can hear the beacon signal five or ten minutes before this time. If you don't have a satellite tracking program, you should start listening 10 or 15 minutes before the time you calculate from the listing.

Refer back to the listing, *Figure 4*, and look at December 3, 1992. The satellite is now overhead for the folks in Hobbs, New Mexico. Although not shown, the previous orbit was not over Kansas but approximately half way between Kansas and the east coast. The following orbit will not be directly over the west coast but, rather about 1,000 miles beyond the coast over the Pacific Ocean.

Then look at December 4. The orbit that was over the east coast on December 2 has now moved to the Midwest. Finally, by December 5, the satellite is once again overhead in Kansas (Sherman, TX shown) and the process repeats. This is the effect of precession mentioned earlier. With this information, you should be able to determine approximately where the satellite is and approximately when it will be within range of your station. You can "tweek" and "tune" the listing after you start hearing the RS10 satellite each day.

LISTEN FOR YOUR ECHOS

After you have your antenna erected and working, wait for the next overhead pass. Set your two-meter radio to a frequency of 145.865 simplex. (I wasted a pass before I noticed the handheld was on duplex. I was transmitting 600 kHz below the satellite band!) Next, tune your 10-meter receiver to 29.365. As the strength of the beacon builds up start keying the two-meter rig on and off while tuning around 29.365, plus or minus three kHz. You should hear a whistle on the 10-meter receiver each time you key the two-meter handheld. This is your "echo," that is, the repeated signal coming down from RS10 each time it hears your two-meter signal. If you keyed the radio with Morse code, rather than simply pushing the transmit button with your thumb, others listening to RS10 would hear you and respond.

HAPPY TRAILS IN THE SKY

Good DXing to you! Hopefully this article gives you enough information to arouse your curiosity about communication via satellite and tells you enough to actually get started. Each month NARA will publish a chart like *Figure 4* to help you determine when you can use the RS10 "birdski." We'll also follow up with articles to make your operation more efficient and more enjoyable. We hope you get active on this mode and keep us advised of your progress.

73 Don Stoner, W6TNS ❑

HOW TO INSPIRE YOUNG PEOPLE

(Continued from page 13)

Another fun check-in we had this past school year was the Pentagon Amateur Radio club. Pat, WJ0T, and Mike, KD4IIZ, kept the kids mesmerized as they described what the Pentagon building looks like, along with a description of what kind of work goes on there. During one of these contacts, Pat invited me to come visit the Pentagon radio station and conduct the CQ All Schools Net from station K4AF.

What a fun time! I arranged for my good friend John, WA2QYX, to be with the children at my school station in Staten Island, while I would conduct the net and talk with them and other schools across the country. It was a very exciting time at our school. I ran a contest about the Pentagon to choose which of my 450 students would attend the session. For weeks the kids were hard at work making reports, diaramas, and charts about the Pentagon. It was a wonderful learning experience.

The net ran for 90 minutes on June 11. Hams and school kids from all over the country were eager to check in and participate in this special event. I got to speak with a young French student in Ottawa, and with a herpetologist in Florida among others. Can you think of another hobby that can provide the opportunity to do such great things to expand the horizons of young people?

Please join Gordon and me on the CQ All Schools Net when the new school term begins. You never know who will pop up there!

73, Carole, WB2MGP ❑

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See the NARA advertisements on page 24 and Cover III for special holiday prices. Also, on orders placed November 15, 1992, through December 31, 1992, enjoy additional savings of no shipping and handling!

Tech Talk *from* ICOM

ISSUE #82

Horizon Expanding Tips For Code-Free Techs!

Last month's Tech Talk was dedicated to Code-Free licensees and described how to expand your amateur radio enjoyment by joining today's 6 meter activities.

This month we continue by encouraging you to upgrade and get that Tech-Plus license. You have already passed the hardest part (theory), so now you can concentrate on learning Morse code rather than splitting between theory and code. Many amateurs tell us learning Morse code at 5 words per minute is actually easier than memorizing a speech and with readily available Morse tapes, it can be mastered in less than two weeks. Some youngsters have learned code during Summer vacation, and some adults succeeded with only 20 minutes a night practice. If they can do it, so can you! Go for upgrading!

In addition to VHF, UHF, and 6 meter privileges, Tech-Plus licensees can work the world via SSB, CW, and packet on the low power-favoring band of 10 meters. You can also operate CW on the 80, 40, and long range 15 meter band. These capabilities really expand your horizons and add new flexibility to your amateur radio life.

Each HF band is different, and your choice of which one(s) to operate depend on the time of day/night and distance you wish to cover. 80 meters, for example, is primarily a nighttime band used for communications up to 1000 miles. It typically opens around sunset and closes shortly after sunrise. This band is good for contacting friends in your local area and adjacent states (they will be the stronger signals in the Tech/Novice CW frequency allocations of 3.675MHz to 3.725MHz).

40 Meters is also a daytime and nighttime short range band, with slightly longer range and noticeably more activity in the Tech/Novice CW range of 7.100 to 7.150MHz. This band is ideal for contacting amateurs in all states, operators are friendly, and the aire is quite congenial. Most 40 meter operators send code at a slow pace and/or QRS (send slower) upon request. If you are pursuing a Worked All States award, 40 (or 80) meters is your best bet for working nearby states that would otherwise "skip over you" on 15 or 10 meters.

15 Meters is basically a daytime band that is open from sunrise until a couple hours after dusk. Outstanding DX conditions are synonyms with this band, especially during major worldwide contests. The Tech/Novice CW operating range on 15 meters is 21.100 to 21.200MHz.

10 Meters is the popular hot spot of action among Tech Plus and Novices, (you are licensed to operate SSB from 28.300 to 28.500MHz and CW or packet from 28.100 to 28.300MHz). Ten is also a daytime band, and it is similar to 15 meters in "open times." Worldwide DXing is great on 10 meters.

If you are using Morse for the first time, here are some helpful tips for operating CW. Listen on Tech/Novice frequencies a few evenings before joining the action (a confidence booster). Remember, many of the operators you hear are also newcomers and may still be perfecting their CW "first." As a good aid, make up a small "cue card" for following CW along with others and filling in the blanks. As an example, most contacts (QSOs) begin with call sign exchange, signal report, name and location (QTH). The other station then transmits similar data, and subsequent transmissions discuss rigs, weather, and personal interests (similar to your CW test).

Using Morse code has a distinct advantage in weak signal DXing and when combined with "Q" codes it results in a semi-international language. You may not speak Italian or Spanish, but you can communicate with amateurs in these lands via Morse code. Sending Morse is easy with a modern electronic keyer and smooth handling paddle, as you need only squeeze appropriate dot/dash fingerpieces to send perfectly timed characters. Using Morse code also reflects a proud skill and, once comfortable with CW, you may find it more fun than voice. This is especially true if you have a high performance Icom transceiver because every model is designed with today's most requested CW (and SSB!) features.

Icom's time-proven IC-735, for example, is well known for its numerous single-cabinet assets. In addition to passband tuning and IF notch filter for minimizing QRM, it has an adjustable noise blanker, SSB speech compressor and SWR metering. Special CW treats include semi and full break-in plus an optional electronic keyer and narrow CW filter (this rig is sharp).

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As you look toward the future and plan that ultimate "big rig," Icom will continue placing you above the crowd with the incomparable IC-765, IC-751A, and pacesetting IC-781. Your dream rig today can easily become your reality tomorrow by going (and staying) with Icom. It is also the best decision in long term radio enjoyment you will ever make!

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- Elmers who want to assist beginners
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- The latest details on rules and regulations
- Repercussions that government regulation changes will have on the future of Amateur Radio
- The latest news on proposed changes to the Amateur Radio Service
- News of interest to Novice and Technician operators
- Help upgrading your license class
- News and developments of particular interest to Novice and Technician class hams
- Pictures and news about other Novices and Technicians
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NARA is the only national organization devoted to representing Novice and Technician class Amateurs!

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The goals of NARA are to:

- Publicize Amateur Radio to the general public
- Get more young people involved in our hobby
- Prevent confiscation of Amateur spectrum and obtain additional allocations for Novices and Technicians
- Represent the interests of Novice and Technician class operators

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HOW DID I GET THIS MAGAZINE?

ONE OF THE WAYS WE CAN TELL THE WORLD ABOUT the goals and ambitions of the National Amateur Radio Association is to supply complimentary copies. We send about 10,000 pieces to newly licensed hams. This magazine is also mailed to a select list of people who might be interested in becoming Amateurs. We also send approximately 10,000 copies to NARA members and prominent people in Amateur Radio.

If your mailing label does not include a NARA membership number, this may be your last or only copy of *The Amateur Radio Communicator*. We would like to continue providing you with this informative publication, but we can only do so if you are a member of NARA. For those interested in becoming a ham, or who are newly licensed, a membership in NARA represents an outstanding bargain. A membership, which includes a subscription to *The Amateur Radio Communicator*, is only $10.00 per year.

Check the mailing label for your membership number. If you don't see one, look at the NARA advertisement and read the benefits of becoming a member of this fast-growing organization. We need your support and so does ham radio. Help us get it "going and growing!"

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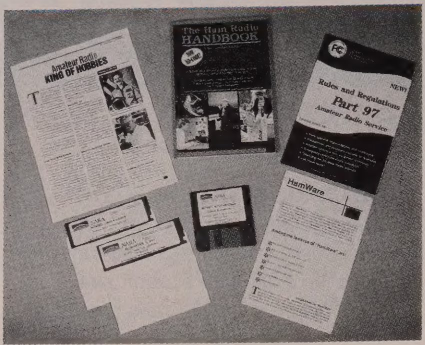
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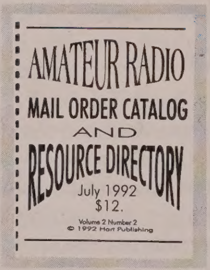

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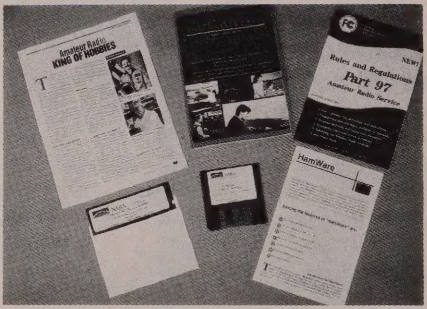
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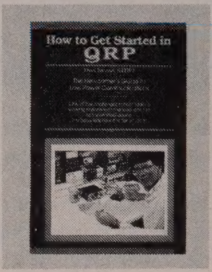

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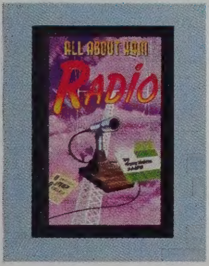

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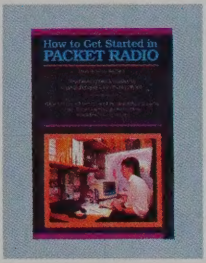

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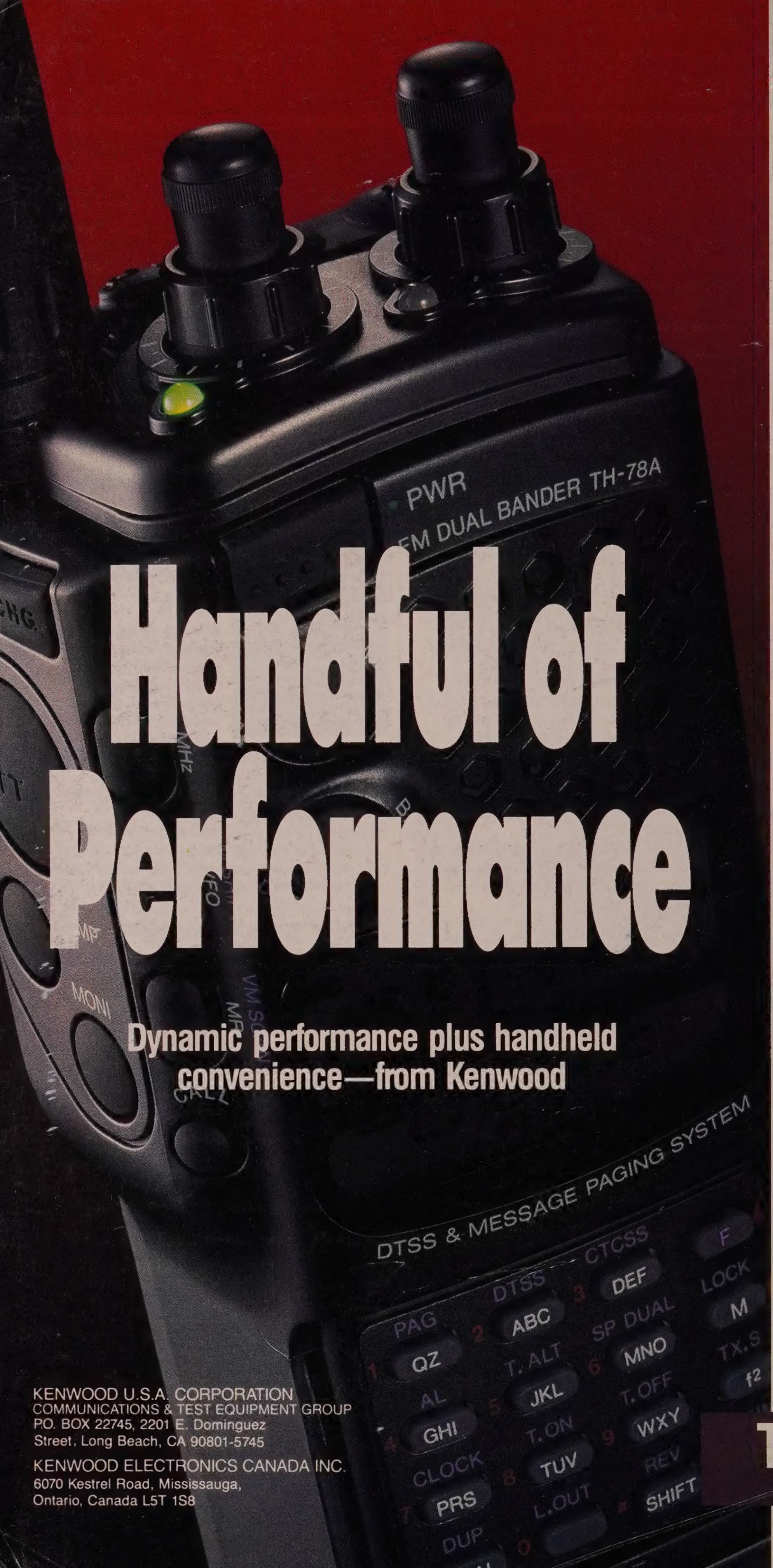
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